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FRANK SHIPLEY COLLINS
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Rhodora

JOURNAL OF

THE NEW ENGLAND BOTANICAL CLUB

Vol. 6 January, 1904 No. 61

TWO NORTHEASTERN ALLIES OF SALIX LUCIDA.

M. L. Fernald.

Salix lucida, with its lustrous foliage and closely flowered golden-yellow staminate aments, is one of the handsomest and easiest recognized of New England willows. As it ordinarily occurs in eastern America the species is a large shrub, but occasionally, when undisturbed, it develops into a small tree twenty-five feet high, with trunks even six inches in diameter. Through the greater portion of its range the species is, for a willow, very constant in its characters; but during the past few years the fact has been more than once impressed upon the writer that in extreme northeastern New England and adjacent Canada *Salix lucida* gradually becomes notably different from the typical shrub, while on the western borders of New England occurs a beautiful shrub so unlike *S. lucida* in many characteristics that by some who know it it has been taken for quite another species.

True *Salix lucida* has the leaves glossy and green on both surfaces, glabrous or glabrate, though when very young bearing some crisp early-deciduous colored hairs. Its mature leaves taper to very elongate (caudate) usually curved tips, while in general outline the leaf varies from lanceolate to ovate.

The variation of *Salix lucida* which is characteristic of extreme northeastern New England and adjacent Quebec and New Brunswick was first detected by Messrs. Emile F. Williams and J. Franklin Collins in 1900, although the plant, with its peculiarity unnoticed, for two years had lain in the writer's herbarium. The material first collected by Messrs. Williams and Collins was from a fine tree at Fort Kent, Maine; and during the summer of 1901 additional speci-

mens from the same source were secured by Mr. Williams, Dr. B. L. Robinson, and the writer. The foliage of the Fort Kent tree was very long for *S. lucida* and the under surfaces of the leaves, especially along the veins, were pubescent with persistent rufous hairs. A comparison made by the writer of this material and an authentic sheet of Andersson's *S. lucida*, var. *macrophylla* led him to identify the Fort Kent tree with Andersson's variety from British Columbia. Subsequently, however, the pubescent-leaved extreme has been watched in northern Maine and Quebec, particularly upon the upper St. Francis where it abounds, and a more detailed examination shows that it cannot well be treated as identical with the British Columbian willow with which it was at first placed.

Salix lucida, var. *macrophylla*, as shown in the Gray Herbarium by a specimen of Lyall's from the Lower Frazer River, has the ample young leaves glaucous and glabrate beneath, though minutely pubescent on the midrib above, and it is apparently a phase of the extreme western *S. lasiandra*, Benth. The northern Maine willow which was once referred by the writer to *S. lucida*, var. *macrophylla*, proves upon further study to differ very constantly in having the leaves green and not glaucous beneath and permanently pubescent on the nerves beneath with sordid or rufescent hairs. This plant with permanent pubescence is found to vary in size from a small shrub of cold swamps, with mature leaves only 4 or 5 cm. long, to well developed trees of rich alluvium, with leaves often 15 cm. in length. Except in the abundance and permanence of the pubescence there seems no other character by which to separate the northern Maine willow from narrow-leaved forms of glabrous or early-glabrate *S. lucida*; but as a variety with marked geographic range it is worthy separation as

SALIX LUCIDA, Muhl., var. **intonsa**. Shrub or small tree, rarely becoming 7 or 8 m. high with trunk 1.3 dm. in diameter: branches of the first year pubescent with mostly permanent sordid or rufescent hairs: mature leaves elliptic-lanceolate, taper-pointed, 4 to 15 cm. long, 1 to 3.5 cm. broad, permanently pubescent, especially on the veins beneath.— *S. lucida*, var. *macrophylla*, Fernald, according to Williams, RHODORA, iii. 277, not Andersson.— By streams and in swamps, St. John River and tributaries, Maine, Quebec, and New Brunswick; Mattawamkeag River, Maine; and Restigouche River, New Brunswick. The following herbarium specimens have been

examined. MAINE, Beau Lac, St. Francis River, August 14, 1902 (*W. W. Eggleston & M. L. Fernald*); Fort Kent, July 22, 1900 (*J. F. Collins & E. F. Williams*), August 11, 1901 (*B. L. Robinson, E. F. Williams & M. L. Fernald*); Island Falls, July 9, 10, 1898 (*M. L. Fernald*, nos. 2452, 2453); NEW BRUNSWICK, Toms Island, Restigouche River, July 30, 1896 (*G. U. Hay*).

The other willow of New England, which, by some who have known it either in the field or the herbarium, has been reluctantly placed with *Salix lucida*, is a remarkable shrub with a varied history. The attention of New England botanists was directed to it in 1899, when Mr. Ralph Hoffmann reported from "a peat-bog in Stockbridge, Mass., a handsome willow, growing as a shrub fifteen feet or less in height"; with the additional notes that "the persistence, or late ripening of the fruit is particularly characteristic; a branch collected September 24, still retains its half opened capsules. The willow grows plentifully in beds of sphagnum, in company with *Betula pumila* L. and *Sarracenia purpurea* L. Mr. C. E. Faxon, who has kindly examined a branch, pronounces it *Salix amygdaloides*, Anders.,"[1] a species then unrecorded east of central New York.

On June 1, 1900, Mr. Hoffmann collected from the Stockbridge bog material in pistillate flower which has been deposited in the herbarium of the New England Botanical Club; and on May 31, 1902, in a deep larch-swamp among the Taconic Mountains, at Salisbury, Connecticut, scarcely twenty-five miles from the Stockbridge bog this handsome willow, in staminate flower, greatly perplexed Messrs. C. H. Bissell, J. R. Churchill, and the writer. In the Salisbury swamp, as at Stockbridge, the willow was associated with *Betula pumila*, while *Salix candida*, *Carex Schweinitzii*, *C. tetanica*, *C. teretiuscula*, var. *ramosa*, and other characteristic plants of the Taconic region were in this or adjacent swamps. At the time of collection the Salisbury shrub was not identified with the Stockbridge willow which had been taken for *Salix amygdaloides*; for, as the Salisbury shrub had the leaves lustrous-green above with gland-tipped petioles, and short-oblong staminate aments, it was temporarily placed with *S. lucida*. Unlike that species, however, which was in the neighborhood, the Salisbury willow had the leaves very pale or even whitened beneath, the character ordinarily relied upon

to distinguish from the eastern *S. lucida* the extreme western *S. lasiandra*. Accordingly, in his recent account of the Salisbury excursion Mr. Bissell has suggested[1] the possibility that further observation may show the presence of *S. lasiandra* in eastern America.

In attempting to settle this problem Mr. Bissell has brought to the writer excellent fruited specimens of the Salisbury willow, which now proves to be quite the same as Mr. Hoffmann's Stockbridge shrub; while an examination of the Gray Herbarium shows the plant to extend southwestward to the mountains of northern New Jersey, and to reappear on Lakes Superior and Michigan; and some fragments from the Bebb Herbarium, generously furnished by Dr. C. F. Millspaugh of the Field Columbian Museum, show it to be also in western New York, northern Ohio and northern Minnesota. The suite of specimens now before him have encouraged the writer to make a detailed comparison of the shrub with the three species to which it has been variously referred, *Salix amygdaloides*, *S. lucida* and *S. lasiandra*, and from them all it proves to be abundantly distinct.

Aside from its firm thick elliptic-lanceolate finely crenulate-serrate leaves which in maturity are pale or whitened beneath and on gland-tipped petioles, the shrub is characterized in early summer by short-oblong dense staminate aments (1 to 1.5 cm. long, 1 to 1.2 cm. thick), the short peduncle, rachis, and short obovate pale straw colored entire scales, softly pubescent with white hairs; the pistillate aments rather loosely flowered, in anthesis 1.5 to 2.5 cm. long, with white-pilose oblong entire bluntish scales. But the most striking condition of the plant is in late September and October when the fruit is mature. Then, when the firm discolorous leaves are about to fall, the matured pistillate aments are 2 to 3.5 cm. long, 2 to 2.5 cm. thick. The spreading capsules are olive or bronze-tinged (rarely pale), thick-walled, conic-subulate in outline, 7 to 12 mm. long, and on thickish pedicels which are only twice as long as the tongue-shaped gland.

From all three species, *Salix amygdaloides*, *S. lucida*, and *S. lasiandra*, with which isolated specimens of this autumn-fruiting willow have been sometimes associated, it is quickly separated by three significant characters: its very late fruiting, the fruiting material at hand having been collected at dates from September 8 to October 9, while the fruited specimens in the Gray Herbarium of *S. amygda-*

[1] RHODORA, v. 34.

loides were collected from May 23 to June 26, of *S. lucida*, May 27 to June 25, of *S. lasiandra*, June 15 to July 7; its thick-walled, conic-subulate capsules which in maturity are 7 to 12 mm. long, the thinner-walled capsules of *S. amygdaloides* being conic-ovoid, 4 to 5 mm. long of *S. lucida* and of *S. lasiandra* narrowly conic-ovoid, 4.5 to 6.5 mm. long; and the thickish pedicels which are about twice as long as the gland, while in *S. lasiandra* the more slender pedicel is three times as long as the gland, in *S. amygdaloides* and *S. lucida* often four or five times as long.

From *Salix amygdaloides* the late-fruiting willow is further distinguished by its short thick aments and by the gland-tipped petioles; from *S. lucida*, as already stated, by its elliptic-lanceolate leaves which are acute or short-acuminate but rarely caudate-attenuate at tip, and pale or sometimes whitened beneath. In leaf-outline it is not unlike some forms of the western *S. lasiandra*, but in view of the three important distinctions already pointed out, the eastern shrub is hardly to be identified with that Cascade Mountain tree.

The only willow which in its conic-subulate capsule and gland-tipped petioles approaches the shrub is the European *Salix pentandra*, a tree which is occasionally cultivated but rarely established about towns from New England to Ohio. That tree, however, has oblong or ovate-oblong leaves, green on both surfaces, the flower-scales glabrous or at first pubescent at base with stiff straightish hairs; and the slightly shorter mature capsules, at least in the American form, subcordate instead of narrowed at base. Furthermore, as *S. pentandra* occurs in New England it matures and loses its fruit in midsummer.

A search through local floras of the regions from which this shrub of our inland sphagnous swamps is known, reveals several interesting notes, all emphasizing its leading characteristic — the late flowering and fruiting. Thus, in Dudley's Cayuga Flora we find: "**S. lucida**, Muhl., var. ——— with beautiful shining, coriaceous, very finely serrate leaves, larger, light-brown pods, and flowers and fruits very much later than in the type, occurs in the Round-Marshes. I have also collected it in Bergen Swamp, N.Y., from which place Mr. Bebb has received it, as well as sparingly from N. J., Ohio, and Mich. Flowers from June 10–30 and matures fruits slowly, the writer obtaining pods still in excellent condition, Sept. 9, 1880."[1] [In the same district

[1] Dudley, Cayuga Flora (1886) 87.

Prof. Dudley found *S. lucida* flowering "May 20–30."] In the Report on Botanical Work in Minnesota for the year 1886, the shrub, though meagrely described, was treated with more assurance as "**Salix lucida** Muhl., var. **serissima** Bailey (*n. var.*). Differs from the species in fruiting very late. It occurrs at Lansing, Mich., where its fruit matures in September, assuming a bright red color in the sun. It is one of the most ornamental of the willows. B 357, Mud river; in fruit."[1] Two years later, Dr. N. L. Britton, noting from northern New Jersey stations for supposed *S. lucida*, said: "In Sussex county this willow holds its fertile catkins until late in September."[2] And, again in 1896, in the account of Plants of Monroe County, New York, and adjacent Territory, Misses Beckwith and Macauley recorded "**S. lucida**, Muhl., var. ——— ? In Bergen Swamp. Flowers June 10–30; fruit last of Aug. to Sept."[3]

That the observations of Messrs. Hoffmann, Bissell, and others in western New England are borne out by these records is very obvious. Furthermore, examination of material of Prof. Dudley's Cayuga shrub and of the original numbered plant from Minnesota and the Lansing (Michigan) material of Bailey's *Salix lucida*, var. *serissima* shows that those plants are quite like the shrub of the Berkshire and Taconic swamps; while one of the specimens first identified with the material from western New England was a finely fruited branch from a swamp in Sussex county, New Jersey.

The late-flowering and fruiting shrub with long thick-walled capsules appears, then, as specially emphasized in the comparisons on a preceding page, to be quite distinct from other willows of the *Pentandrae*; and the name first applied to it when Prof. Bailey considered it a variety of *S. lucida* recognizes its most obvious characteristic. Its characters and known history may be briefly summarized as follows.

Salix **serissima**. Shrub, sometimes 4 m. high; the branches covered with olive-brown lustrous bark, branchlets brown or yellow-tinged, glabrous, lustrous: leaves elliptic-lanceolate, or on young shoots sometimes oblong-lanceolate, acute or short-acuminate, in maturity dark shining green above with a broad whitish midrib, pale or whitened beneath, thick and firm, 4 to 8 (on sterile young shoots

[1] Bailey in Arthur, Geol. & Nat. Hist. Surv. Minn., Bull. no. 3 (1887) 19.

[2] Britton, Cat. Pl. N. J. (1889) 226.

[3] Beckwith & Macauley, Proc. Rochester Acad. Sci. iii. (1896) 103.

even 10 or 11) cm. long, 1 to 3.5 cm. broad, closely and finely glandular-serrulate; the slender lustrous petioles tipped by 1 to 3 pairs of glands: winter buds lance-oblong, 5 to 7 mm. long, olive-brown or castaneous, lustrous: aments on short white-pilose peduncles, terminating short leafy branches: the staminate ament short-oblong, 1 to 1.5 cm. long, 1 to 1.2 cm. thick, the rachis white-pilose; scales short-obovate, entire, pale straw-color, white-pilose; filaments loosely hairy at base: pistillate aments loosely flowered, in anthesis narrowly oblong, 1.5 to 2.5 cm. long, with white-pilose oblong entire bluntish scales; style evident; stigmas 2, thick, 2-lobed; mature ament 2 to 3.5 cm. long, 2 to 2.5 cm. thick, the spreading-ascending mostly olive or brown-tinged thick-walled lustrous conic-subulate capsules 7 to 12 mm. long, their thickish pedicels 1 to 2 mm. long, twice exceeding the oblong-lingulate gland.— *S. lucida*, var., Dudley, Cayuga Fl. (1886) 87. *S. lucida*, var. *serissima*, Bailey in Arthur, Geol. & Nat. Hist. Surv. Minn., Bull. no. 3 (1887) 19. *S. lucida*, in part, Britton, Cat. Pl. N. J. (1889) 226. *S. lucida*, var.?, Beckwith & Macauley, Proc. Rochester Acad. Sci. iii. (1896) 103. *S. amygdaloides*, C. E. Faxon according to R. Hoffmann, Rhodora, i (1899) 229, not Andersson. *S. sp.*, C. H. Bissell, Rhodora, v. (1903) 33.— In deep sphagnous bogs or larch-swamps, from the Housatonic Valley, Massachusetts, to the north shore of Lake superior, south to Morris Co., New Jersey, western New York, northern Ohio, Michigan, Wisconsin and Minnesota, flowering from late May to late June or early July, the fruit mature from late August to October. Massachusetts, peat-bog, Stockbridge, September 24, 1899, June 1, 1900 (*Ralph Hoffmann*): Connecticut, larch-swamps, border of Twin Lakes, Salisbury, October 9, 1901 (*C. H. Bissell*, no. 5511), May 31, 1902 (*C. H. Bissell & J. R. Churchill*), near State Line, Salisbury, May 31, 1902 (*C. H. Bissell, J. R. Churchill, & M. L. Fernald*), Sept. 22, 1903 (*C. H. Bissell*): New Jersey, margin of pond near Sparta, Sussex Co., September, 1867 (*C. F. Austin*); Budd's Lake, Morris Co., August 6, 1869 (*T. C. Porter*— Field Columbian Museum, no. 2804): New York, Round-Marshes, McLean (*W. R. Dudley*— Field Col. Mus., no. 5904); Buffalo (*G. W. Clinton*— Field Col. Mus., nos. 4370, 4372): Ohio, Painesville, Lake Co., 1871 (*H. C. Beardslee*— Field Col. Mus., no. 7106); Ashland Co., July 11, 1899 (*Selby & Boyd*, no. 1488— Field Col. Mus., no. 103208): Ontario, Pic River, Lake Superior (*Loring*): Michigan, Flint, 1871 (*D. Clarke*— Field Col. Mus., nos. 2426, 2427); Lansing (*L. H. Bailey*— Field Col. Mus., no. 6401); Jackson, Sept. 8, 1893 (*S. H. & D. R. Camp*— Field Col. Mus. no. 2709): Wisconsin, Milwaukee (old specimen, presumably from Lapham, in Gray Herb.): Minnesota, Mud River, Vermillion Lake, July 28, 1886 (*Arthur, Bailey, & Holway*, no. B 357 — Field Col. Mus., no. 6390).

The stations from which we know *Salix serissima* suggest that it

should be looked for at other points in New England and New York. Its occurrence with *Betula pumila*, *Salix candida*, *Carex Schweinitzii*, and other characteristic swamp plants of the Berkshire and Taconic Mountain region, indicates that it may be sought with some confidence in Bennington County, Vermont, and with real assurance in Dutchess and Columbia Counties, New York. In fact, the junction of these two counties of New York with Litchfield County, Connecticut, is at the base of Mount Riga, just north of the State Line swamp where *Salix serissima* was first studied by the writer. Larch swamps to all appearances the same extend westward from northern Litchfield County nearly to the Hudson Valley, and are characterized[1] by *Betula pumila*, *Salix candida*, *Valeriana sylvatica*, *Viburnum Opulus*, *Cypripedium spectabile*, *Carex Schweinitzii*, *C. tetanica*, *C. teretiuscula*, var. *ramosa*, etc., all of which with the exception of *Valeriana* (abundant only three miles west of Salisbury) are among the typical plants of the Stockbridge or the Salisbury marshes; while many of them occur with *Salix serissima* in the swamps of northern New Jersey, in the famous Bergen Swamp of Genesee County, New York, or in the marshes near Cayuga Lake. It will, then, be indeed surprising if an exploration of similar tracts fails to reveal in eastern New York, as in western Massachusetts, northwestern Connecticut, northern New Jersey, and northwestern New York, *Salix serissima* as a companion of these notable species.

GRAY HERBARIUM.

NOTES ON NEW ENGLAND VIOLETS.

E. BRAINERD.

(Plate 50.)

A MOST noteworthy instance of the segregation of an old species is to be found in the recent treatment of the common blue violet. The polymorphous group of plants included in the last edition of the Gray Manual under *Viola palmata* and its var. *cucullata*, it is now proposed to divide up into at least thirty species.

This radical treatment of a common and familiar plant, though not

[1] See L. H. Hoysradt, Bull. Torr. Cl. VI. appendix.

without precedent, naturally challenges our attention and criticism. Even an amateur student of botany may be tempted to scrutinize the facts that appear in his limited field of observation. That the reader may understand upon what data the present article is based, the writer may perhaps be pardoned for saying, that for the past two seasons his botanical field work from May to October has been almost entirely devoted to this genus, that he has collected and examined some two or three thousand plants from over two hundred stations in Western Vermont and Western Massachusetts, and that much of his material has been examined and discussed by expert students of the genus. His purpose is to put on record certain facts of observation that may prove of interest, and to give the results of his study as to specific limitations.

I desire to express herewith my grateful appreciation of the courtesies and assistance that I have received in the course of my studies from Mr. C. L. Pollard of the National Museum, from Prof. Greene of the Catholic University, and from Dr. Robinson of the Gray Herbarium. I am also under great obligation to numerous friends for the use of valuable material from many localities.

It is only in recent years that students of our violets have paid attention to the development of the plant during the summer months. In the Synoptical Flora (1895) the specific characters are taken almost exclusively from the plants as they appear when flowering in Spring, though the existence of later cleistogamous flowers, "abundant and short peduncled," is stated. Even Mr. Pollard, who has distinctly urged the importance of studying the mature plant, is, in his treatment of Viola in the recent Manuals of Dr. Britton and of Dr. Small, quite vague in his account of the apetalous flowers and their mature capsules. Yet right here are to be found the most marked and constant characters on which to divide the acaulescent blue violets into species. These plants are best understood, as are the Cruciferae and Umbelliferae, *when in fruit.*

This is indeed what might have been expected from certain well known biological laws. In the evolution of species the most marked differences are found to appear when the individual has reached the climax of its life-history. The young of allied species are more alike than the adults. An herbaceous plant in its vernal state, even though in flower, has often less pronounced characters than when in summer or autumn it has attained its full size and produced its seed. "By their fruits ye shall know them."

It may be well here to rehearse briefly the methods of reproductive economy that prevail in those species of Viola that have neither stems nor stolons. The petaliferous flowers that appear in May have a special mechanism that ensures cross-fertilization. They are believed to be sterile unless visited by insects with pollen from another flower. Their infertility has been often observed, especially in foreign gardens, from which doubtless the requisite insects were absent. But in the wild I have, during the past season, found these capsules to be usually fertile. It takes three or four weeks from the time of flowering for the capsule to ripen its seeds. It then splits into three boat-shaped valves with very thick rigid keels. As the thin sides of the valve dry and contract, the seeds within are more and more pinched, until they fly out, one or two at a time, to a distance of several feet. (See Rhodora, iv. 183 & 230.)

Soon after petaliferous flowering, the plant begins to produce from the crown of the rootstock minute, apetalous, self-fertilized flowers on peduncles that are short and horizontal, or long and ascending, according, for the most part, as the plant grows in a dry or in a wet situation. But in all cases as the capsule ripens, the peduncle lengthens; and the effort of the plant is to lift the capsule into the air, and to raise it from a nodding to an erect position, after which it opens and scatters its seeds, as did the earlier capsules. When thickly covered with dead leaves the blanched peduncles are often six or more inches in length, and may never succeed in getting the ripe capsules up into the air. But I certainly have never discovered in the "cleistogenes" any "tendency to bury themselves deep in the ground instead of remaining close to the surface," such as Mr. Pollard attributes to *V. domestica*, Bicknell. (Bot. Gaz. xxvi, 337.) The mature capsules of all species are normally "aerial" and not "hypogaeous."

A vigorous plant under favorable circumstances, especially in the open, will continue to bear fruit from cleistogamous flowers from July till the last of October. The cool wet weather of last August was specially favorable for all species of violets, and they bore abundant fruit in the autumn. The capsules of the apetalous flowers usually differ somewhat in appearance from those of the petaliferous flowers. They have this advantage for purposes of study that they may be had at almost any time during a period of three or four months. It is upon differences that are found in the apetalous flowers and their

capsules — differences in shape, size, color, in form of sepals and of auricles — that I believe specific distinctions in the acaulescent violets can be most satisfactorily based. These characters prove to be fairly constant; they seem to have no "biological importance," and so are not subject to "adaptive changes," and have, therefore (to use Dr. Gray's terms once more), "high classificatory value."

That the importance of these characters has hitherto escaped attention seems strange; but it may be accounted for by two facts. First, the plants are most attractive when in vernal flowering; if fruit and mature leaves are wanted, most collectors have been satisfied to collect the plants a month later, before they are injured by the drought and insects of summer but before the apetalous capsules are mature. Secondly, the capsules of the apetalous flowers, even when but half-grown, split open on drying, and the sepals shrivel, so that their characters in ordinary herbarium specimens are greatly obscured.

I present herewith a synopsis of the New England species of acaulescent, non-stoloniferous violets, with the omission of *Viola pedata*, which, since it has beardless petals and a peculiar style, Dr. Gray has placed in a group by itself.

A. Apetalous flowers subulate; their mature capsules bright green, oblong, acute, 5–15 mm. long; sepals on mature capsules lanceolate, nearly as long as the capsules; with straight auricles 2–5 mm. long. (Pl. 50, fig. 1.)

1. V. CUCULLATA, Ait. Plant usually glabrous; leaves broadly cordate-ovate; petaliferous flowers blue varying to white, often with a darker blue center; peduncles longer than the leaves; — springs, cold brooks and bogs, and moist soil of mountains.

B. Apetalous flowers ovoid-acuminate; their mature capsules purple, subglobose, mostly obtuse, 4–8 mm. long; sepals on mature capsules one half as long as the capsules, with short appressed glabrous auricles. (Pl. 50, fig. 2.)

2. V. VENUSTULA, Greene. Plants small, glabrous throughout; leaves ovate-acuminate, 2–5 cm. wide; petals blue; peduncles about as long as the leaves; — moist, mucky borders of streams, marshes and lakes.

C. Apetalous flowers ovoid-acuminate; their mature capsules pale green, or more or less speckled with purple, oblong, acute or acutish, 8–15 mm. long; sepals one quarter to one third as long as the capsule, with short appressed commonly hispidulous auricles. (Pl. 50, fig. 3 & 4.)

* Leaves never lobed, broadly ovate or reniform, 4–12 cm. wide.

† Plants essentially glabrous; petals violet.

3. V. LATIUSCULA, Greene. Leaf-outline above the cordate base approximately deltoid, earliest leaves purplish on the under surface, petioles puberulent or slightly pubescent; — dry copses in sandy or sterile soil.

4. V. PAPILIONACEA, Pursh. Leaf-outline above the cordate base broadly orbicular, earliest leaves green on the under surface, petioles usually glabrous; — rich moist soil, often in yards and cultivated ground.

† † Plants more or less villous-pubescent; petals light blue or lavender.

5. V. SORORIA, Willd. Moist rich woodlands, shady ledges, meadows and pastures.

* * Some or all of the leaves palmately divided or lobed.

† Plants more or less villous-pubescent; petals light blue.

6. V. PALMATA, L. Dry open woods and ledges.

† † Plants nearly or quite glabrous; petals bright blue.

7. V. SEPTEMLOBA, LeConte. Sandy soil near the coast.

D. Apetalous flowers sagittate on horizontal or deflexed peduncles; their mature capsules purple, subglobose, 4–6 mm. long; sepals somewhat obtuse and ciliolate, with long divergent auricles. (Pl. 50, fig. 5.)

8. V. SEPTENTRIONALIS, Greene. Plants pubescent or subglabrous; earliest leaves purplish on the lower surface; mature leaves ciliate, broadly ovate, 3–7 cm. wide; petioles slender, wiry, often purple at base; petals violet, with sepals closely ciliolate nearly to the tip; — dry or moist copses.

E. Apetalous flowers sagittate on erect peduncles; their mature capsules green, ovoid or oblong, 6–14 mm. long; sepals lanceolate with long hispidulous auricles. (Pl. 50, fig. 6.)

* Leaves pubescent, ovate-oblong, petioles usually shorter than the blades; petals violet-purple.

9. V. FIMBRIATULA, J. E. Smith. Dry soil.

* * Leaves nearly glabrous, lanceolate, basal lobes spreading toothed or incised, petioles usually longer than the blades; petals deep violet.

10. V. SAGITTATA, Ait. Wet meadows and marshes.

I subjoin a few comments on each of these ten species.

1. *Viola cucullata*, Ait., is beautifully distinct. Prof. Greene was the first to call attention to its distinctness in Dec. 1896. (Pittonia, iii. 143 & 336.) There is, however, still some uncertainty as to whether this was the plant that Aiton had before him when he gave the name in 1789. Prof. Greene now regards the group as separable into about ten species, and names much of the Vermont material *V. prionosepala*.

The specific name — *cucullata* — is not especially appropriate except to plants that grow in open bogs; those that grow in the shade have leaves as widely spread as those of any other species. All violet leaves are involute in the bud. When expanding they have the shape of a monk's hood, the basal lobes being rolled in so as to touch each other; and when full grown, if evaporation is excessive, they all tend to revert to this natal condition. If a violet specimen is not soon put in press after it is collected, the basal lobes

will roll inward, and even the mature leaves will appear cucullate when dried. In the field I believe this character is of doubtful value; in the dried specimen it is often misleading.

Viola cucullata, more than any of its allies, affects a cold situation. It thrives near perennial springs and along cold brooks. It is the common violet of mountain regions, where it is often found on wood-roads and along highways.

This species is omitted from Dr. Small's recently published Flora of the Southern States. But there is in the Gray Herbarium a specimen of it, collected in the mountains of North Carolina by Rugel, October 1841. It has petaliferous flowers that differ from those of spring in having sepals with long auricles, such as regularly appear in the apetalous flowers. For this reason Shuttleworth considered Rugel's plant a distinct species. But numerous specimens from several localities in Western Vermont show that *Viola cucullata* not infrequently has petaliferous flowers in autumn, and that these as a rule have long-auricled sepals. A period of mild, springlike weather in autumn often causes the appearance of vernal flowers. It is as though under this impulse the life-forces of the violet got confused, and mixed the characters of its two kinds of flowers. The *V. macrotis* and the *V. leptosepala* of Greene also remind one of this "long-eared" form, which might occasionally occur in spring as well as in autumn.

2. *V. venustula*, Greene, is notably the smallest plant of the group. The type is from the vicinity of Ottawa, Ont., but the species is of frequent occurrence at low elevations in the Champlain Valley. Probably when understood the species will be found to have a much wider distribution.[1]

Under division "C" we have a natural group of five species or subspecies, in which the details of flower and fruit are much alike. They are separable from one another chiefly by features that appear in the foliage — pubescence and lobation — characters which are obvious enough when fully developed, but inconstant and intergrading. In the most pronounced form of *V. palmata* the leaf is 5–7-parted; but plants with 3–5-lobed leaves (var. *dilatata*, Ell.) are perhaps more common; and growing with these are plants with

[1] I have recently seen specimens collected by Messrs. Bissell and Andrews at Lakeville in the northwest corner of Connecticut, and specimens from Willoughby Mt. collected by Mr. Eggleston.

one or more entire leaves, and still other plants with all the leaves entire. It is extremely difficult to make out how these last differ from *V. sororia*. The situation is quite the same when we consider the character of pubescence. We find specimens of *V. sororia* with dense, almost matted, pubescence on the petioles, others with sparse spreading pubescence, others with mere traces of pubescence just below the blade, and this on only one or two leaves, and finally other plants quite glabrous. Somewhere in this shifting series we pass from *V. sororia* to *V. papilionacea*. In several other species of Viola we find pubescence just as variable a character. *V. blanda* is sometimes quite pubescent, but often nearly or wholly glabrous; so is *V. rotundifolia*; so is *V. renifolia*. Under these circumstances it would seem that in the genus Viola, whatever may be the case elsewhere, pubescence, unless correlated with other characters, is not a satisfactory basis on which to found a species. Possibly these correlated characters may yet appear. Meanwhile, as I am loth to make new names or new combinations, I provisionally speak of these five forms under division "C" as species.

3. *V. latiuscula*, Greene (Pittonia, v. 93, Nov. 1902), was founded upon specimens from Twin Mts., West Rutland, Vermont. The plant proves to be of frequent occurrence in dry sterile soil in western New England and adjacent New York. It was collected by the writer in May, 1899, on the dry open sand-plains near Fort Ethan Allen, Essex, Vermont. On revisiting the station for mature leaves and fruit in June, 1903, after over fifty days of rainless weather, I found that the plant had completely disappeared. But on a third visit, September 11, after a rainy August, large plants in abundance bearing copious fruit were to be had. The plant had become as completely dormant during the summer drought as during the winter cold. Further facts tend to show that certain species of stemless violet are capable of leading a double existence, passing, with intervals of rest between, through a vernal and an autumnal stage that differ from each other in foliage, flower and fruit,— thus posing as a sort of Jekyll and Hyde among plants.[1]

[1] *Viola rotundifolia*, Michx. well illustrates this; there is a marked contrast between the April plant with its small leaves and yellow flowers, and the August plant with its large leaves and chocolate cleistogamous flowers on branching peduncles (really, disguised stolons). Pursh described the latter form as a distinct species, *V. clandestina*; though he opined its connection with Michaux's species. But for this opinion he was taken to task by Schweinitz, who stoutly asserts that *V. rotundifolia* "can have *no affinity whatever*" with *V. clandestina!* (Am. Jour. Sci. v. 63.)

4. *V. papilionacea*, Pursh, is the name taken up in recent years by Messrs. Greene and Pollard for the common purple-flowered violet of meadows and orchards, including the form found frequently in door-yards and borders of streets (*V. domestica*, Bicknell). In New England the species is more frequently seen within fifty miles of the coast than farther inland. In habitat and general aspect it seems quite distinct from its near ally, *V. latiuscula*. But when one attempts to state the difference, as in the above synopsis, the marks of distinctness are found to be elusive,— if not illusory.

5. *V. sororia*, Willd. The colored plate that accompanies the original publication of this species represents the petioles as erect and edged with sparse spreading hairs. This is a peculiarity of the plants to which we apply the name, and there can be no reasonable doubt as to its applicability. Dr. Britton so understands the species in the Illustrated Flora (ii. 448). It is the commonest of all violets in the Champlain Valley and occurs in various situations. In wet mucky woodlands its leaves are not infrequently 40 cm. high and 15 cm. wide; in the hollows of open pastures and on sparsely wooded hillsides its leaves are usually but 7–10 cm. high and 5–7 cm. wide. In the latter situation it fruits in autumn far more abundantly than in the former.

I have included under *V. sororia*, several of Prof. Greene's species, especially his *V. cuspidata*, *V. Dicksonii*, and *V. nodosa*,— confessing my inability to make out any other than trifling or local differences between them. In Pittonia (v. 103) Prof. Greene has called attention to a singular feature that he has observed in *V. Dicksonii*: — the occurrence of underground fruit "converted into what appears to be a berry. It is evidently globose (as large as an ordinary wild gooseberry, or middle-sized pea), absolutely indehiscent, the pressed and dried pericarp being unbroken, translucent and showing the seeds that lie within, just as, in the herbarium, the seeds of many a berry-like fruit are seen through their fleshy covering in its dried state." This is but a malformation of the capsule due to the sting of a gall-fly. A dissection of the "baccate fruit" in August shows the presence of the scarlet larvae of a species of this sort of insect. We find that at least four other species of Viola — *V. palmata*, *V. venustula*, *V. cucullata* and *V. septentrionalis* — are attacked in the same way, though with less frequency.

6. *V. palmata*, L., has been found in Vermont in only a few

stations from the middle of the State south along the western border, and only in the form bearing leaves with 3–5 shallow lobes. The form with deeply divided leaves I have collected as far north as Great Barrington, Mass.

7. *V. septemloba*, Le Conte, is in New England confined to the costal regions. I include under this name *V. Brittoniana*, Pollard, which I cannot regard as specifically distinct from the plant of Le Conte.

8. *V. septentrionalis*, Greene (Pitt. iii. 334). This admirable species was founded upon specimens collected by J. M. Macoun near Ottawa, Ont., in May and June, 1898. Several sheets of this collection are in the Gray Herbarium. Prof. Greene has recently made several other species, from different localities, out of what seems to be essentially the same thing as the Ottawa plant. *V. septentrionalis* he now regards as a local species, and calls the plants sent from Vermont, *V. subviscosa*. Believing as I do in their specific identity I am obliged to use Prof. Greene's oldest name, — a name, by the way, as felicitous for this northern species, as the other name is infelicitous, the plant being never in the least viscous.

At the time of vernal flowering the species might be confused with *V. sororia*, both having cordate-ovate pubescent leaves ; but one soon learns to distinguish it by the rich violet of the petals and the purple coloring on the lower surface of its earliest leaves. These marks, indeed, after a few months fade out in herbarium specimens. But here I find a fairly reliable mark in the fine ciliation of the sepals extending nearly or quite to the tip. In *V. sororia* the sepals are obscurely ciliate and that chiefly at the base. When, however, one examines *V. septentrionalis* in late summer, it is seen to be more closely related to *V. fimbriatula* than to any other species. This resemblance is seen in the pubescence, in the color of the petals, in the form of the apetalous flowers and fruit, and in the ciliation and long auricles of the sepals. Nevertheless there are obvious and radical points of difference between the two species, and no one would think of merging them into one.

The species is a common one in the northern New England States. Mr. Eggleston has collected it on the cold cliffs of Smugglers' Notch. I have seen it from numerous stations in Maine and New Hampshire. Mr. Bissell has it from at least two stations in Connecticut. I have collected it in Lanesboro, Mass. In western

Vermont it is frequently found in partial shade on gravelly hillsides. It especially affects the company of young conifers, and thrives in the open groves of arbor-vitae that abound on the rocky shores of Lake Champlain.

9. *V. fimbriatula*, J. E. Smith, has been separated of late years by general consent from *V. sagittata*, and is too well known to call for special comment.

10. *V. sagittata*, Ait., has not been found in Vermont or in the Berkshire Hills. In New England it seems to be for the most part restricted to the neighborhood of the coast.

Some may query whether these closely allied species are ever found to hybridize under natural conditions. It often happens that colonies of two species are growing intermixed, and it would not be strange if occasionally a crossing should be effected in the petaliferous flowers through the agency of insects. I am aware that evidence of such crossing should be weighed with great caution and verified in all possible ways; but an important phase of this report would be omitted if I failed to state that in three instances I have found plants that had every appearance of being hybrids. One of these that I have watched for two seasons, is in flower, fruit and foliage a striking intermediate between *V. fimbriatula* and *V. sororia*; the second is an intermediate between *V. cucullata* and *V. venustula*; and the third, an intermediate between *V. septentrionalis* and *V. venustula*. In all instances the supposed parents were near at hand and numerous. Mr. Pollard, who has seen flowering specimens of the first mentioned hybrid, was inclined to regard it rather as a new species; and so it may be — possibly. But I fancy that more than one of the many new species recently proposed, based on plants from a single station, seen only in petaliferous flower, may prove on more extended observation to be hybrids. This interbreeding may, indeed, be more extensive than we have supposed, and be one of the causes of the perplexity that has attended the study of these interesting plants.

Middlebury College, Middlebury, Vermont.

THE PSEUDO-MONOCLINISM OF CHIONANTHUS VIRGINICA.

ALFRED REHDER.

SOME years ago *Chionanthus virginica*, which though not native to New England is often cultivated for its ornamental qualities, attracted my attention by some peculiarities in its fruiting and flowering. I noticed that the shrubs in bloom presented noticeable differences in their appearance and that some shrubs bore fruit abundantly, while others had no fruit at all. An examination of the flowers of several shrubs showed some difference in their structure and as I could not remember any notice of it in botanical literature, I decided to make a closer investigation. I examined carefully the flowers of all the shrubs of the species growing in the Arnold Arboretum, of which 14 were planted in one group together, while one shrub was standing solitary some distance away from that group. I marked them all with numbers and took notes on the structure of the flowers of each one of the shrubs; besides those I observed two shrubs standing solitary in private gardens. As the chief difference between the flowers I found that one part had well developed stigmas and smaller anthers which did not open, but fell off still closed with the fading corolla, while others had a rudimentary stigma, though the ovary and the style seemed to be normal, and larger anthers shedding pollen freely; occasionally, however, I found among the first kind of flowers a few anthers which opened and discharged their pollen. Only four plants of all those observed belonged to the second kind and these four plants, as I found in comparing again my notes with the plants, when the fruits were ripening, bore not a single fruit, though all other shrubs surrounding them were loaded with fruits. The three solitary plants, which all belonged to the first kind, had only a few fruits; a small part of the flowers apparently had been fertilized by the occasionally appearing fertile anthers; the number of fruiting panicles in these plants was comparatively small and each panicle bore only 1 to 3, rarely more fruits, while the shrubs in the group mentioned above, which were growing side by side with pollen-bearing plants, had a very large

number of fruiting panicles and each one bore from 5 to 12 and occasionally even to 20 fruits.

The chief differences which show, however, intergradations between the staminate and the pistillate flowers, as they may be called, though the latter are not perfectly monoclinous, are the following —

Pistillate flowers: calyx with ovate to lance-ovate sepals, shorter than or as long as the style, petals generally smaller and narrower, usually about 20 mm. long; filaments elongated, about half as long as the anthers, these narrower, distinctly apiculate, exceeding the corolla tube, the anther-cells remaining closed; pistil with well developed stigma (fig. 2).

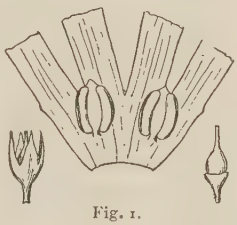

Fig. 1.

Staminate flowers: calyx with lanceolate sepals, longer than the style, petals generally longer and broader, attaining 28 mm. in length, stamens occasionally 3 or 4, filaments very short, anthers short-apiculate, 1.5–2 mm. long, not or slightly exceeding the corolla tube; pistil somewhat smaller with imperfectly developed stigma (fig. 1).

Fig. 2.

The ovary of the staminate plant, though somewhat slenderer, hardly differs from that of the pistillate plant and contains apparently well developed ovules. The anthers of the pistillate flowers also have the appearance of normal anthers, though somewhat narrower, and are filled with numerous pollen cells, but these differ from the normal ones in being somewhat smaller and nearly subglobose and I could not distinguish the granular structure of the extine which can be observed in the normal ovoid anther cells.

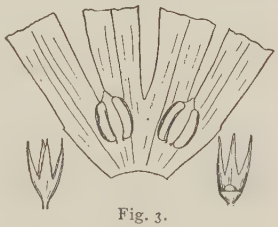

Fig. 3.

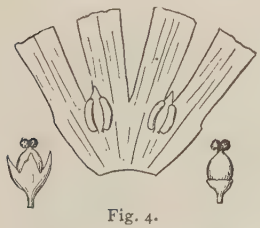

Fig. 4.

The panicles of the staminate plants are usually larger and more floriferous, and as the individual flowers have generally longer and broader petals, the staminate plants are more showy in bloom and therefore superior as an ornamental plant.

In the second species of the genus, *Chionanthus retusa*, Lindley &

Paxton,[1] the polygamy was observed by Maximowicz; the differences in this species are much more pronounced, because in the staminate flower the pistil is reduced to a small subglobose body, otherwise they are of the same character, as the accompanying illustrations (fig. 3 and 4) show. Also the anthers in the pistillate flowers seem to remain closed as far as can be judged from herbarium specimens.

In the literature of systematic botany I failed to find any reference to the polygamy of *Chionanthus virginica*; in the generic descriptions which include *C. retusa* the genus is characterized as having perfect or polygamous flowers, while *C. virginica* is always described with perfect flowers. The polygamy, however, has been observed before and the first notice of it I found in the Horticulturist of 1857 (12: 266), where Th. Meehan in an article on trees and shrubs with ornamental fruits makes the following remarks about the Fringe-tree: "Many trees do not bear and others imperfectly .... for though it is classed .... with the perfect flowering plants, it is in reality polygamous, as much so as the Ash." A similar statement in an unsigned note, probably also by Th. Meehan, appeared in the Gardeners' Monthly of 1885, (27: 228). Two years later Meehan[2] gives a short account of his observations on the polygamy in *Chionanthus virginica*, accompanied by two figures showing the different styles, and he remarks that Gray notes in "the later edition of his Manual" that Chionanthus is occasionally polygamous. I could, however, find no allusion to it in Gray's Manual nor in any of the more recent American floras, and it seemed to me therefore not useless to draw again attention to the fact that the flowers in *Chionanthus virginica* are not monoclinous, but are, what probably would be the best term for it, andro-dioecious, though they could be called perhaps as well imperfectly dioecious. These terms will apply to the whole genus, for there is no real difference between the two species in this respect, only the Asiatic species represents a more advanced state of dioecism.

Arnold Arboretum.

[1] Brit. Fl. Gard. 3: 85, f. 273 (1853).

C. chinensis, Maximowicz, Bull. Ac. Sci. St. Petersb. 20: 430; Mél. Biol. 3: 393 (1874).

[2] Proceed. Acad. Nat. Sci. Philad. 1887: 280 (1888).

SOME NOTES ON GALIUM.

K. M. Wiegand.

In my previous paper on the genus Galium[1] several varieties of *Galium tinctorium* were described among which was the variety Labradoricum, and the range there given was "In sphagnous bogs Connecticut, New York and Wisconsin northward to Labrador. Since that time Mr. M. L. Fernald has generously supplied me with fruiting specimens and has called my attention to the fact that this form is really a distinct species, quite different in many respects from *Galium tinctorium*. Observations made during the past summer have fully convinced me of the correctness of his view, and it seems, therefore, desirable to raise this variety to specific rank as follows.

Galium **Labradoricum** sp. nov. (*G. tinctorium Labradoricum* Wiegand Bull. Torr. Bot. Club **24**; 398, 1897.) Low and erect, or ascending and more diffuse if in shady places, 1–4 dm. high, moderately stout: stem 4-angled, nearly or quite smooth: early in the season somewhat bushy branched, but later through the elongation of erect branches appearing often nearly simple: internodes 1–4 times the length of the leaves: leaves mostly in fours, 5–13 mm. long, oblong-linear, rounded at the apex, cuneate at the base, glabrous except the aculeolate margins, dull above, usually more or less reflexed: flowers very few in groups of 2–6 on short terminal peduncles which later become stout and apparently lateral: pedicels short, mostly reflexed in fruit, 1–3 fld.: corolla large 2–3 mm in diam. white, lobes 4, acute: fruit small, glabrous; carpels 1.25 mm. diam. usually but one developing: endosperm a hollow sphere.

Sphagnous bogs and arbor vitae swamps, Connecticut, New York and Wisconsin northward to Labrador.

Specimens studied; — Oswego Co., New York, *Rowlee & Wiegand* 1895 (type, in herb. Cornell Univ.); Connecticut (Torr. Herb.): New York (Torr. Herb.): Wisconsin (*Lapham*); Lake Superior (*Loring*); Maine (Aroostook Co., *Fernald*); Newfoundland (*Waghorne*, 1893); Labrador (*Storer*).

This species grows quite generally throughout the sphagnous bogs of northeastern North America and seems confined to such localities, while *G. tinctorium* grows normally in ordinary swamps or

[1] Galium trifidum and its North American Allies. Bull. Torr. Bot. Club **24**; 389, 1897.

marshes and is a more southern plant. It differs from *G. tinctorium* in the fruit which is only one-half as large, the carpels of the latter species being 2.25–3 mm. in diameter, in the position of the fruit on short stout apparently lateral branches, and in the more reflexed leaves which are of equal breadth throughout or slightly spatulate, but not with a tendency toward the lanceolate form as in *G. tinctorium*. But it is similar to the latter species in the smooth stem, sparsity of flowers, 4-parted acute-lobed corolla and fruit maturing usually but one carpel, and in the hollow spherical endosperm.

Cornell University, Ithaca, New York.

A Newly Introduced Galium.— Last summer in the latter part of June, while wandering through a low, swampy meadow at Norfolk, Conn., I chanced upon a small clump of yellow Galium.

At first sight I thought the plant was the yellow bedstraw that is occasionally found in this region, *G. verum*, L., and wondered that it should blossom a month earlier than usual and choose such soil, as before I had always found it in dry, sandy fields. Upon closer inspection I was convinced that this clump was not *G. verum*. The plants were more slender with fewer and larger flowers, while the flower clusters were shorter and more scattered upon the stem. Being unable to find any description of it, a specimen was sent to the Gray Herbarium where it was determined as *G. praecox*, Lang in Hagenbach's Flora Basiliensis Supplement, 26 (1843). The Norfolk plant was compared with specimen no. 2222 "Flora Exsiccata Austro-Hungarica" and was also matched with specimens from Deidesheim collected by Schultz Bipontinus and labeled *G. Wirtgeni*, Schultz, the latter name appearing to be a synonym for *G. praecox*, Lang. Our plant is a native of Central Europe and this, so far as known, is the first report of its introduction into New England. — Mary C. Seymour, Norfolk, Connecticut.

Plants New to the Flora of New Bedford. — In a dumping ground on the outskirts of New Bedford I found in June a colony of about a dozen plants bearing diminutive, white, umbellate flowers. It was necessary to revisit the locality later to obtain fruited specimens essential in determining the species, which proved to be *Coriandrum*

sativum, Willd. Coriander is cultivated in England, and the seeds, which are aromatic, are used for seasoning and in some forms of confectionery. Its occurrence here may be traced perhaps to its use, by the English operatives in our cotton mills. *Centaurea vochinensis*, Bernh., a pretty composite flower, was found in both of the neighboring towns of Dartmouth and Westport. *Hypochaeris radicata*, L. mentioned in an early number of RHODORA as found at Wood's Hole grows in great abundance in and about one of our public parks. It resembles greatly the Fall Dandelion, *Leontodon autumnalis*, and is already a troublesome weed and difficult to eradicate. Another rare weed found for the first time in this locality is *Camelina microcarpa*, *Andrz.* I am indebted to Mr. M. L. Fernald for his valuable assistance in determining these uncommon plants. — E. WILLIAMS HERVEY, New Bedford, Massachusetts.

NOTES ON PUBLICATIONS RECENTLY RECEIVED.

IN his popular work on the ferns[1] of the Northeastern States Dr. C. E. Waters has told with great clearness and in excellent literary style practically all that most amateurs will wish to know about the Filices and Ophioglossaceae of our flora. The book is profusely illustrated by fine half-tone reproductions of very cleverly taken and well selected photographs, exhibiting all phases and features of fern life from massed individuals in the natural habitat to microscopic details of the sporangia.

Mr. Alfred Rehder has recently published an admirable synopsis of the genus Lonicera. This paper, which forms the pièce de resistance in the 14th Report of the Missouri Botanical Garden, is the outcome of a patient and exceedingly detailed examination of a large genus, the difficulties of which are from the chiefly Asiatic distribution of the species little realized by most American botanists. Mr. Rehder enumerates 154 good species, together with a great number of varieties, forms, hybrids, and doubtful species. Synonymy, bibliography, and copious citation of herbarium specimens are added in great detail.

[1] Ferns, a Manual for the Northeastern States, with analytical keys based on the stalks and on the fructifications, by C. E. Waters, Ph. D. of Johns Hopkins University. New York, Henry Holt & Co., 4to, 362 pp.

The paper is unique in recent American literature in dealing so exhaustively with a large and complicated group of plants chiefly of Old World distribution. The specific delimitation of our New England species is but little modified by Mr. Rehder's treatment, although there are some necessary nomenclatorial changes from the usage of Gray's Manual, thus *L. ciliata*, Muhl., is made to give way to the earlier *L. canadensis*, Marsh., and *L. glauca*, Hill, to *L. dioica*, L. The paper is illustrated by twenty plates. Although it was not found practicable to publish specific descriptions in the synopsis, the running keys are so complete that the lack of the characterizations will scarcely be felt. Throughout the work is critical and scholarly.

Mr. Alexander Wallace has just published an attractive and readable book on the heather.[1] Although dealing primarily with the folklore and romance of his subject the author has taken great pains to bring together the existing scientific records of the habits and distribution of the heather both in Europe and America. Among many pleasing illustrations there is an excellent portrait of Boston's distinguished horticulturist, Mr. Jackson Dawson, and a reproduction of "Vanity Fair's cartoon of the Flower Committee of the Massachusetts Horticultural Society searching for the Heather at Tewksbury,"—features which alone are worth the price of the book.

The most gigantic enterprise in recent systematic botany, the Pflanzenreich, a collaborative work being prepared under the energetic editorship of Professor Engler and designed to include specific as well as generic descriptions of all known plants, is making excellent progress. The latest issues include monographic treatments of the *Scheuchzeriaceae*, *Alismataceae*, and *Butomaceae* all by Professor Franz Buchenau, the *Lythraceae* by Professor E. Koehne, and *Taxaceae* by Dr. R. Pilger.

Mr. Theodor Holm has published in the Ottawa Naturalist, xvii. 149–160, some well illustrated Biological Notes on Canadian Species of Viola, a paper which will be found interesting by New England students of the genus. Mr. Holm groups the species according to peculiarities of the rhizone.

[1] The heather in Lore, Lyric and Lay, by Alexander Wallace, editor of the Florist's Exchange. New York, De la Mare Publishing Co. 8vo, 245 pp.

Vol. 5, no. 60, including pages 281 to 308, plate 49, and title page of volume 5, was issued December 22, 1903.

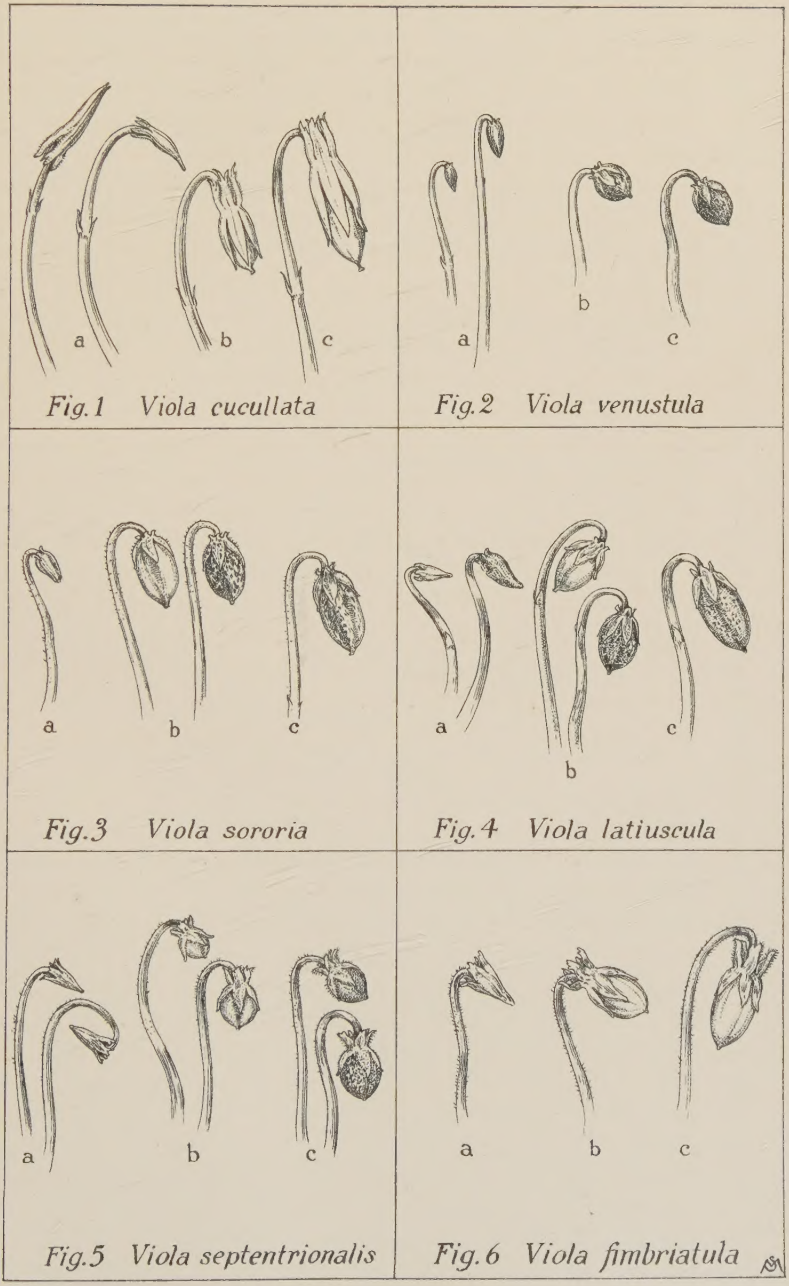

Fig. 1 Viola cucullata

Fig. 2 Viola venustula

Fig. 3 Viola sororia

Fig. 4 Viola latiuscula

Fig. 5 Viola septentrionalis

Fig. 6 Viola fimbriatula

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